

1011376



# PATENT SPECIFICATION

DRAWINGS ATTACHED

1011376

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## COMPLETE SPECIFICATION

### Improvements in Fluid Pressure Relief Valves

We, DAMIC CONTROLS LIMITED, a British Company, of 30 Hans Road, Knightsbridge, London, S.W.3, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to pressure relief valves for incorporation into fluid circuits particularly hydraulic fluid systems which valves are designed to open at a predetermined pressure to allow fluid to return to a hydraulic fluid reservoir or tank.

Such valves necessarily have to withstand very high pressures, particularly in the case of hydraulic pressure fluid systems on automobiles, aircraft or missiles and of necessity must occupy a minimum of space.

Furthermore it is necessary for such valves to be accurately set so that they will operate at the predetermined pressure and when closed shall maintain a perfect seal under high pressure and under widely different temperature.

The chief object of the invention is to evolve a pressure relief valve which will adequately fulfil the above conditions.

A fluid pressure relief valve in accordance with the present invention includes a body composed of two interfitting axially movable parts, having connections at their opposite end for the inflow and outflow of fluid, the outer part for the entry of fluid having a frusto-conical seating, the inner part containing a cylindrical piston valve axially slidable into engagement with the seating by an associated spring the end of the piston valve which engages the seating being of frusto-conical shape, the tapered face of the valve being formed with an annular groove containing a trapped "O" type sealing ring which makes sealing contact with the frusto-conical seating, and a sleeve nut in threaded engagement with the outer body part and engaging the inner body part to move the body part axially relative to one another and thus vary the compression of the spring to

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increase or decrease the pressure of the piston valve on its seating, the piston valve having one or more fluid ports or passages through which the fluid, having lifted the piston valve off its seating, can escape through the outflow connection.

Referring to the accompanying drawings the figure illustrates in longitudinal section a pressure relief valve in accordance with the invention in its closed position.

The relief valve illustrated includes a body composed of interfitting axially movable parts 1 and 2 having axial bores 3 and 4 at their end for the inflow and outflow of fluid respectively in the direction of the arrows.

Part 1 has an enlarged axial boring 5 for the reception of a tubular part 6 of part 2 and is formed with a frusto-conical seating 7 for a piston valve having a frusto-conical seating engaging end, the piston valve being generally indicated by reference numeral 8, slidably mounted in an axial boring in part 6 and urged into engagement with seating 7 by a helical coil spring 9. Piston valve 8 is formed with ports 10 for the passage of fluid when the piston valve is lifted from its seating under the pressure of the fluid.

Body part 1 where it encloses part 6 is formed with an internal annular groove to house an "O" type sealing ring 11 to prevent seepage of fluid between the parts.

Body part 1 where it encloses part 6 is externally threaded to engage a surrounding sleeve nut 12 having a shoulder 13 engaging a shoulder 14 on part 6 the nut being held captive on part 6 by a circlip 15.

The sleeve nut 12 is preferably externally knurled at 16 for ease of operation and it will be appreciated that the action of tightening the nut will have the effect of compressing spring 9 to a greater extent thus urging the piston valve more firmly into engagement with its seating to increase the pressure required to lift it from its seating.

To lock the sleeve nut in any adjusted position it is fitted with set screws 17 the extremities of which frictionally engage ex-

ternal knurlings or splines 18 on part 1.

Piston valve 8 is preferably of the known kind illustrated comprising a two diameter cylindrical part 19 bored axially to receive a spigot 20 on a frusto-conical part 21 of less diameter, an "O" type sealing ring 22 being trapped between the face of upstream part 21 and the walls of a recess in part 19 so that the ring is distorted, the periphery of the sealing ring engaging seating 7. The part 19 has a frusto-conical face 23 immediately behind the sealing ring which also engages the seating and as there is always a clearance between upstream part 21 and the seating 7 the fluid will act on the sealing ring to force it more intimately into engagement with the seating to ensure a good closure effect.

The sleeve nut 12 is adjusted until the piston valve will only lift from its seating when a predetermined pressure is reached and immediately that pressure is reached the fluid can pass the piston valve and flow through ports 10 and out of the axial boring 4.

#### WHAT WE CLAIM IS:—

1. A fluid pressure relief valve including a body comprised of two interfitting axially movable parts, having connections at their opposite ends for the inflow and outflow of fluid, the outer part for the entry of fluid having a frusto-conical seating, the inner part containing a cylindrical piston valve axially slidable into engagement with the seating by an associated spring, the end of the piston valve which engages the seating being of frusto-conical shape, the tapered face of the valve being formed with an annular groove containing a trapped "O" type sealing ring which makes sealing contact with the frusto-conical seating, and a sleeve nut in threaded engagement with the outer body part and engaging the inner body part to move the body part axially relative to one another and thus vary the compression of the spring to increase or decrease the pressure of the piston valve on its seating, the piston valve having one or more fluid ports or passages through which the fluid, having lifted the piston valve

off its seating, can escape through the outflow connection.

2. A fluid pressure relief valve as claimed in claim 1 wherein the frusto-conical head of the piston valve includes two inclined faces of different diameter between which the "O" type sealing ring is mounted, to provide a clearance space between the seating and the upstream inclined face when the other inclined face is in contact with the seating through which clearance space the pressure fluid can pass to act on the sealing ring and force it more intimately into engagement with the seating.

3. A fluid pressure relief valve as claimed in claim 1 or 2, wherein the outer body part is formed with an internally arranged annular groove containing an "O" type sealing ring for making sealing engagement with the inner body part.

4. A fluid pressure relief valve as claimed in any of the preceding claims, wherein the inner body part has a cylindrical axial boring in which is mounted the piston type valve and a helical compression spring urging the piston type valve into engagement with its seating.

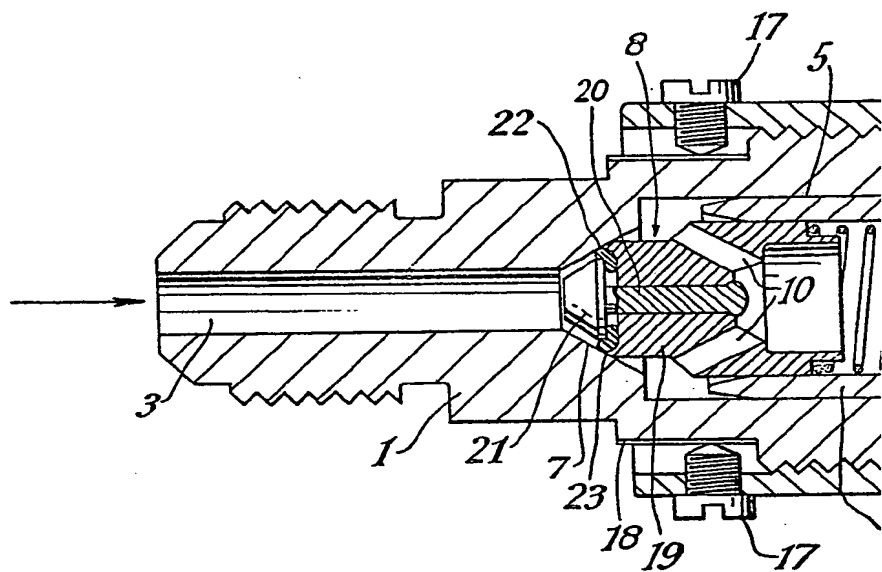
5. A fluid pressure relief valve as claimed in claim 1, wherein the sleeve nut is fitted with one or more set screws which project radially inwardly to frictionally engage knurling or splines on the outer body part, the sleeve nut being in threaded engagement with the outer body part and having an inwardly directed flange for engaging a shoulder on the inner body part and held in engagement therewith by a circlip on the inner body part.

6. A fluid pressure relief valve substantially as described with reference to the accompanying drawing.

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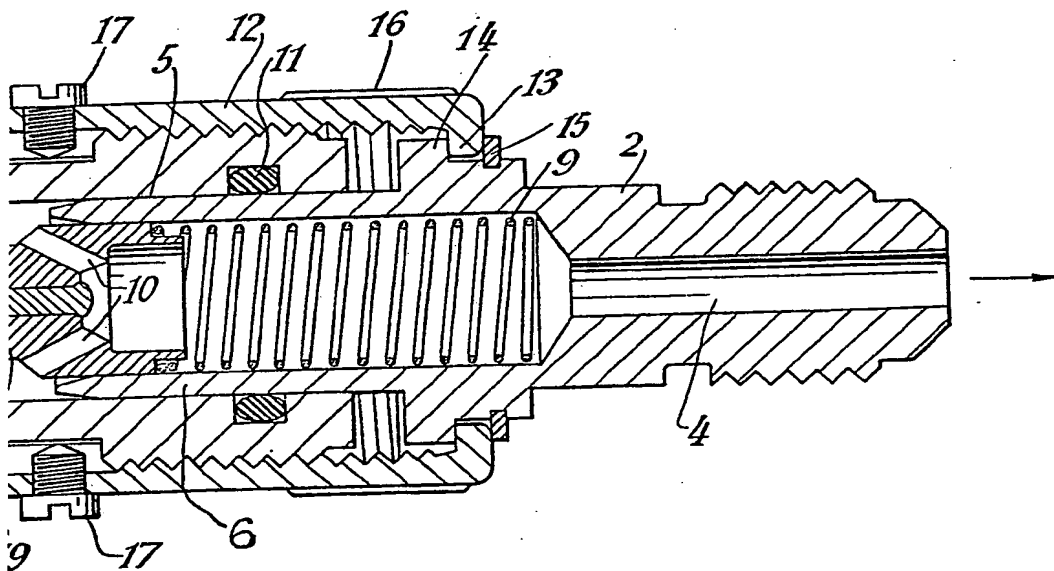


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COMPLETE SPECIFICATION

1 SHEET

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the Original on a reduced scale*



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